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DECEMBER, 1930

ENTOMOLOGICAL NEWS

Vol. XLI No. 10

FERDINAND HEINRICH HERMAN STRECKER
1836-1901

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1
Act of October 3, 1917, authorized January 15, 1921.

ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors; John C. Lutz, Business Manager.

Advisory Committee: Philip Laurent, J. A. G Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

United States and possessions . .	$3.00
Canada, Central and South America .	3.15
Foreign	3.25

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 8.00
Ten issues " 11.00, " 20.00, " 35.00, " 70.00

SUBSCRIPTIONS. All remittances and communications regarding subscriptions, non-receipt of the NEWS or of reprints, and requests for sample copies, should be addressed to

ENTOMOLOGICAL NEWS, 1900 Race Street, PHILADELPHIA, PA.

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MEXICAN MINISTRY OF AGRICULTURE
MEXICO CITY, MEXICO.

DR. ALFONSO DAMPF

ENTOMOLOGICAL NEWS

VOL. XLI. DECEMBER, 1930 No. 10

North American Institutions Featuring Lepidoptera.

XIX. Entomological Institutions in Mexico.

By J. D. GUNDER, Pasadena, California.

(Plates XXIX-XXXIII).

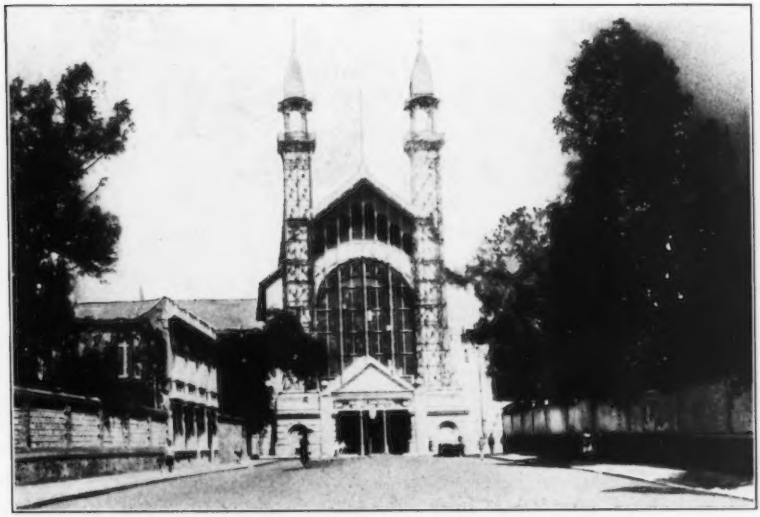
Mexico, to North American entomologists, is one of the most interesting countries in the world for it presents a field of virgin and almost unlimited possibility. With a great diversity of climate and vast land areas, ranging from tropical to near arctic on the lofty peaks, its variety of forms can only be compared to certain of the western countries of South America. Before the great Ice Age began and before the glaciers dominated our territory, North America was inhabited, not only by the present fauna and flora, but also by a great number of the southern plants and animals, which retreated to the south before the cold and found refuge in the plains and mountains of Mexico. The entomological fauna of Mexico is therefore of interest to every taxonomist and student collector and especially to those in south-western United States, not only for the great similarity which exists, for example, between the insect world of Arizona and of Sonora, or between Texas and Tamaulipas, but chiefly for the stock of preglacial fauna now distributed over the mountains of this southern Republic. It is too early, of course, to discuss from a zoological point of view, the history of Mexican insect life, which is very imperfectly known. Unfortunately Mexican entomology is still in its infancy.

Many species of Lepidoptera from Mexico were originally described by Linnaeus and his associates and in recent years since the publication of the *Biologia Centrali-Americana,* research work has been greatly stimulated. F. D. Godman and Osbert Salvin prepared the *Biologia* parts relating to the Rhopalocera and Herbert Druce and others completed the Heterocera sections.

The oldest of the Mexican lepidopterologists and the owner of the largest collection of Mexican butterflies and moths is Mr. Robert Müller of Mexico City. See Plate XXXIII. Aided by numerous local collectors and for over a period of 40 years, he has accumulated nearly 5000 species, including Pyralids. Practically all his new species and forms, numbering nearly 1000, were described several years ago by the late Dr. H. G. Dyar and by Schaus, Busck and Clark and the types of practically everything are in the National Museum at Washington, except paratypes which were retained by Müller. There are still some 500 undescribed lepidoptera in the collection, mostly Noctuids and Geometrids. Recently Mr. Müller's nephew, Prof. Max Draudt, a well known collaborator of Seitz, has published some new forms of Noctuids and Bombycids from this outstanding collection. Another lepidopterist of note in Mexico is Mr. Pablo Petersen of Puebla. His collection, though extensive, does not contain type material.

At the present time organized entomological investigation, including the study of lepidoptera, is being carried on by three separate institutions or at three individual centers of research. All are in Mexico City and each has men in charge who are thoroughly scientific and capable, so that the next decade should see a more rapid advancement in entomological knowledge within the Republic.

First. At the Mexican Plant Protection Service of the Ministry of Agriculture, which combines the activities of the U. S. Bureau of Entomology, of the Plant Quarantine and Control Administration, the Insecticide & Fungicide and of the Phytopathological Service of the U. S. Bureau of Plant Industry. The building of the Department of Research, which includes a chemical, a bacteriological, a mycological and an entomological laboratory, with insectaries and experimental fields, is shown at the top of Plate XXIX and is under the direction of Dr. Alfonso Dampf. This building is quite new, being only recently occupied and the grounds were not in shape when the photo was taken. The Department possesses a collection of Mexican insects in all Orders and a special collection of agriculture pests. Breeding experiments with material from all parts of Mexico



The National Museum of Natural History of Mexico City

Dr. Isaac Ochoterena, Director

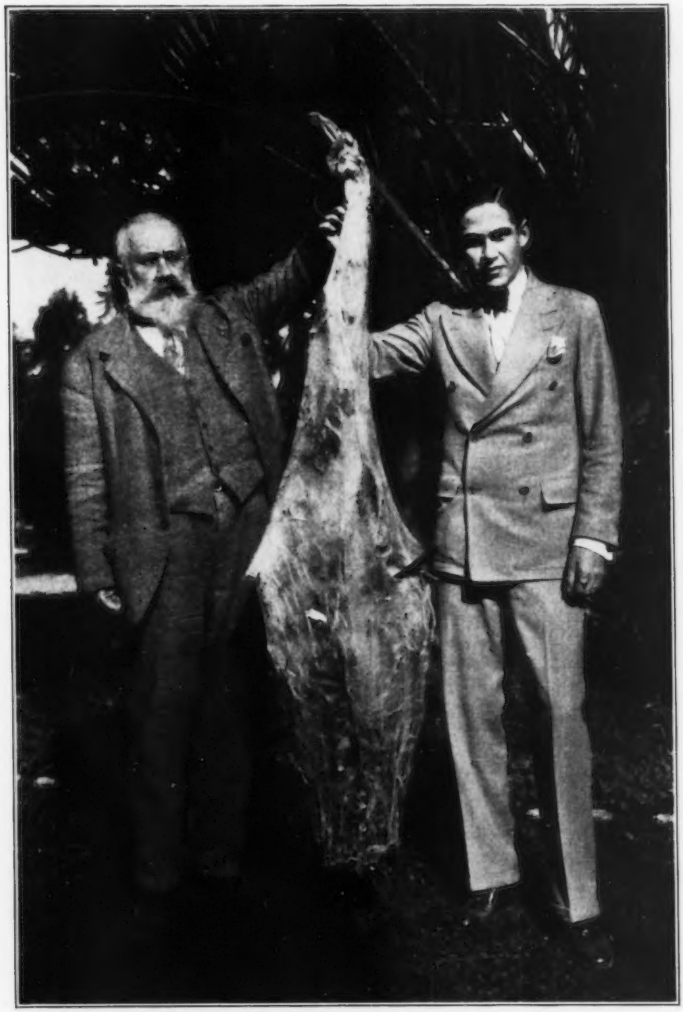
Dr. W. J. Holland, Dr. C. C. Hoffmann and Dr. I. Ochoterena on the terrace of the Casa del Lago in Mexico City. Dr. Holland is holding a cover-glass containing a specimen of *Clisiocampa azteca* which they are interested in examining.

yield interesting specimens, especially in Lepidoptera and Coleoptera. Plate XXXII shows a silk nest of *Eutachyptera psidii* built by living caterpillars and the man to the left is Leopold Conradt, curator of the Republic's entomological collections. He is an old experienced field man who has made entomological trips to central Asia and tropical Africa, and who collaborated with Godman & Salvin as editors when they were assembling data, especially on Coleoptera from Guatemala and Mexico as well. The man to the right in the picture is Mr. Ignacio H. Olmedo, a capable young entomologist from the Department.

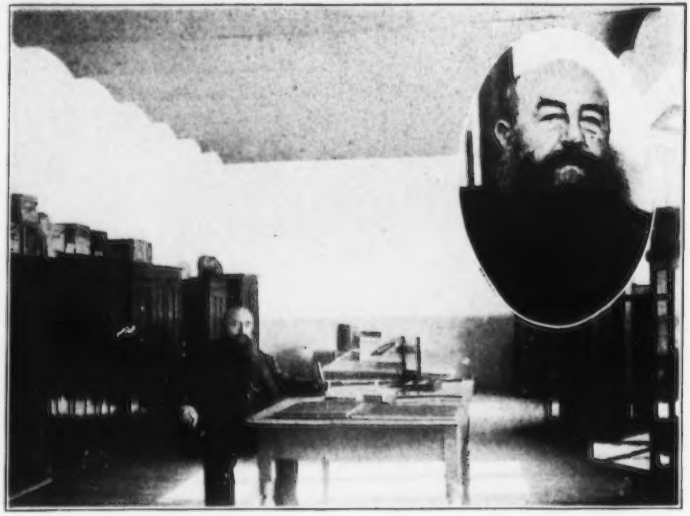
Dr. Dampf is organizing and building up Mexico's entomological service and he is doing about what Riley and Howard accomplished for the United States in the early days. Conditions in Mexico are quite different, both politically and economically however. The Doctor was born on the small island of Dagoe in the Baltic Sea, between Sweden and Esthonia, November 20, 1884. He went to school in Reval, Esthonia, where he had the good fortune to come in touch with that first class lepidopterist and scientist, Wilhelm Petersen, known through his profound investigations on the morphology and anatomy of Lepidoptera. The University years were spent in Königsberg, the home of Immanuel Kant, the great philosopher, and the doctors' degree was received in 1909, when he entered the staff of the Zoological Museum of the University, as assistant keeper of the collections with a view of preparing for a professorship. A trip in 1910 to Egypt and in 1912 to the Faroe Islands in the North Atlantic were used to collect entomological material. In 1913 he followed a call of the Imperial Colonial Office and became Government Entomologist in German East Africa, now Tanganyika Territory. At this time a fascinating period of travel and collecting began, only to be interrupted and ended by the world war. Dr. Dampf was for a year and a half Director of the Cotton Experiment Station at Mpanganya on the Rufiyi River near which wild elephants, zebras, waterbucks and hippopotamuses abounded. Later he enlisted under the immortal Lettow-Vorbeck and went into the brush to defend East Africa against a foe who was a hundred times stronger and more numerous. The years of 1918 and

1919 were passed in Egypt (entomological results unpublished) and between 1920-23 quiet entomological work was again continued in the old City of Königsberg. By October, 1923, the old continent was changed for the new and Dr. Dampf was invited to Mexico by the government to become professor of entomology and parasitology. Numerous field trips through Mexico followed, including a six months' expedition on horseback into Yucatan, British Honduras and Guatemala. These excursions yielded the necessary knowledge of the land and folk and brought an enormous amount of material together which is still being sifted. In 1927 the Plant Protection Service of the Mexican Government was founded and Dr. Dampf was appointed Head of the Research Department, a position which he still holds. His 85 publications comprehend Lepidoptera, Aphaniptera (fleas), Diptera and agriculturally and medically important subjects. He has just finished an article on an interesting lepidopteron from baltic amber and recently sent in a description of the first Mexican Paussid (Ins., Coleoptera). Also he is working on a monograph of the Mexican Simuliids (black flies or buffalo gnats). His personal collection includes Microlepidoptera, slides of fleas and insects of economic importance.

Second. The Department of Public Health in Mexico City with its dependency, the Institute of Hygiene, is where studies in medical entomology are being carried on. The entomological laboratory at the Institute is under the direction of Prof. C. C. Hoffmann, who is actively working on the mosquitoes of Mexico. He has published extensive papers on Mexican ticks and has investigated the transmission of a filariasis by the *Simulium* gnats. Prof. Hoffmann has a fine personal collection of Mexican Lepidoptera and has described several species and forms. His collection is probably next to Müller's in size and is being continually built up. It has the reputation of being in perfect order and up-to-date. A portrait of Prof. Hoffmann is found on Plate XXXI together with those of I. Ochoterena and Dr. W. J. Holland. Dr. Holland was in Mexico City this last spring setting up a replica of the skeleton of the dinosaur *Diplodocus carnegei* for the National Museum and I am indebted



LEOPOLD CONRADT (Left) and I. H. OLMEDO (Right) Holding a Silk Nest of the Social Living Caterpillars of *Eutachyptera psidii*



Don Roberto Müller of Mexico City Has the Largest Collection of Mexican Lepidoptera

to the Doctor for this picture. He also furnished me with certain data concerning entomological conditions in Mexico.

THIRD. At the Biological Institute of the Mexican National University various phases of entomological study are continually in progress. This Institution was formerly under the supervision of the Mexican Secretary of Agriculture, but last year came under the control of the University. The actual director is Prof. Isaac Ochoterena who is a fine scientist and known more as a pathologist and botanist. Portrait on Plate XXX. His staff works on problems of pure and applied science, as on hydrobiology and microbiology and on the flora and fauna of Mexico in general, etc. Prof. Hoffmann and Prof. Leopoldo Ancona H. are on the entomological staff of this Institute and they have published various and many papers on Mexican entomology.

Prof. Isaac Ochoterena was born at Atlixco, Puebla in 1885 and he is the son of the late Colonel Pedro Ochoterena, who was a distinguished Mexican militarist in the defense of his Country at the time of the so-called Maximilian Government. Prof. Ochoterena's early studies were accomplished in the old National Preparatory School and a few years afterwards he was appointed Inspector of Education in the State of Durango. Later he was called to the chair of embryology and histology of the National Medical College and to professorship in the Military Medical School. He has written a text book on biology and published some 76 scientific papers, of which a third or more are dedicated to the histology of the nervous system.

Prof. Ochoterena is head of the National Museum of Natural History in Mexico City which is fostered by the Biological Institute of the University. It is located on Calle Chopo and occupies a huge building constructed of steel and glass (Plate XXX). This building was erected a number of years ago as one of the structures used by the International Exposition. At the time it was filled with Japanese exhibits. Its replacement by a thoroughly modern museum building has been for a long time agitated. This Museum, which is the principal one in Mexico, originates from the union of several ancient museums

and from the collections of the Mexican geographical explorations. Prominent naturalists such as Villada, Urbina, Rovirosa, Herrera, Mendoza, Penafiel, Patoni, Ferrari-Perez and a local host of others have contributed towards its contents. The botanical department boasts of a splendid herbarium and there is a well classified collection of rocks and minerals. The library of the Institution contains a rich selection of books and pamphlets numbering more than twenty thousand. The collections of insects on display are largely synoptic in character, and, while many Mexican insects are shown among the Lepidoptera, there are also fair series of the Lepidoptera of other parts of the world. I believe this Museum houses the only public display, or only good public display, of insects in Mexico.

[This article concludes the series on "North American Institutions featuring Lepidoptera" which has been running continuously in the NEWS since February, 1929. I would like to take this opportunity of expressing my sincere thanks to the many entomologists who have made possible the numerous plates and these pages of text. The future will decide whether they have been worth while.—AUTHOR.]

Spiders Found in the Stomachs of Sceloporus graciosus graciosus (B. & G.) (Araneina).

The following list represents the species of Spiders found in the stomachs of a series of lizards of the species *Sceloporus graciosus graciosus* (B. & G.), which were collected at localities in Utah as indicated below.

Mr. Gertsch identified the spiders, most of which were males.

GNAPHOSIDAE Gen. et sp? Fillmore Canyon, June, 1927, U. of U. Zool. Exp.

ARANEA sp? Fillmore Canyon, June, 1927, U. of U. Zool. Exp.

XYSTICUS SIMPLICIOR Chamberlin and Gertsch. Fillmore Canyon, June, 1927, U. of U. Zool. Exp.

LYCOSA AVIDA (Walckenaer). Ephraim, Utah.

PELLENES HIRSUTUS Peckham. Hatch, Utah, June, 1927, U. of U. Zool Exp.

PELLENES OREGONENSIS Peckham. Hatch, Utah, June, 1927, U. of U. Zool Exp.

PHIDIPPUS sp? Fillmore Canyon, June, 1927, U. of U. Zool. Exp.

WILLIS J. GERTSCH and LOWELL A. WOODBURY,
University of Utah, Salt Lake City, Utah.

Descriptions of Four New Species of Mimetic Miridae (Hemiptera).*

By HARRY H. KNIGHT, Ames, Iowa.

Coquillettia nigrithorax n. sp.

Clavus white and therefore suggestive of *foxi* Van D., but differs otherwise in the black color of head, thorax and legs; also differs in the smaller size and relatively longer rostrum.

♂. Length 4.3 mm., width across base of cuneus 1.3 mm. Head: width .69 mm., vertex .30 mm. Rostrum, length 1.3 mm., just attaining hind margin of sternum. Antennae: segment I, length .26 mm.; II, 1.21 mm.; III, 1.12 mm.; IV, .56 mm.; black. Pronotum: length .69 mm.; width at base 1.12 mm.

Color black, coxae and femora of front legs, and sometimes lower half of face, brown with orange tinge. Clavus opaque white, tinged with yellow, blackish at base; corium clear white, black on apical third; embolium pale, fuscous at base and black on apical third. Cuneus opaque white on basal half, tinged with yellow bordering the black on apical half. Membrane uniformly blackish, pale with milky tinge across basal three-fifths of larger areoles. Ostiolar peritreme and posterior margin of third abdominal segment white as in allied species.

Holotype: ♂ September 9, 1928, Tucson, ARIZONA (A. A. Nichol); author's collection. *Paratypes:* 3 ♂ August 16, Apache County, 2 ♂ August 18, 1927, Socorro County, Arizona (R. H. Beamer).

Coquillettia granulata n. sp.

Allied to *atrithorax,* but differs in the smaller size, white discal area of membrane, and the fine, white granular coating on all parts of the body.

♂. Length 3.4 mm., width .98 mm. Head: width .69 mm., vertex .31 mm. Rostrum, length 1.17 mm., reaching to near posterior margins of middle coxae. Antennae: segment I, length .21 mm.; II, 1.08 mm.; III, broken; black. Pronotum: length .62 mm., width at base .99 mm.

Black, juga and lora brownish; all parts of body including hemelytra and legs, finely coated with a white granular exuda-

* Contribution from the Dept. of Zoology and Entomology, Iowa State College, Ames, Iowa.

tion which is rather similar to that found in many species of *Platytylellus*. Hemelytra black, transversely white across clavus, corium, and embolium between tip of scutellum and tip of clavus; basal two-fifths of cuneus opaque white. Membrane fuscous, larger areoles and discal area between and extending distad to slightly beyond a line connecting tips of cunei, milky white. Ostiolar peritreme and posterior margin of third abdominal segment, white.

♀. Length 3.4 mm.; wingless, ant-like. Uniformly black, covered with a fine granular white residue as in the male. Head: width .74 mm., vertex .60 mm.; length .99 mm., rather thick. Pronotum: length .58 mm., greatest width (.62 mm.) across coxal clefts which are visible from above; strongly and evenly convex but more cylindrical than globose. Without vestige of wings; tergite of first abdominal segment strongly arched, pale; posterior margin of second tergite and the posterior half of the sternite of third segment, pale. Abdomen behind the third segment strongly globose, sparsely clothed with pale pubescence.

Holotype: ♂ May 21, 1909, West Wats, UTAH (E. D. Ball); author's collection. *Allotype:* same date as the type. *Paratypes:* 3 ♂, taken with the types. The writer is indebted to Dr. Ball for this species which was received unmounted in a pill box with a few other specimens.

Sericophanes albomaculatus n. sp.

Allied to *triangularis* Kngt., and having very similar white markings, but differs in the more convex scutellum and in the shorter second antennal segment which is not equal to basal width of pronotum; also differs in the dark brown color and blackish membrane.

♂. Length 3.6 mm. ,width 1.09 mm. Head: width .69 mm., vertex .32 mm. Rostrum, length 1.64 mm., reaching upon fourth ventral segment, dark fuscous brown. Antennal segment I, length .216 mm., pale brownish; II, .92 mm., brown to fuscous; III, .65 mm., dark fuscous; IV, .56 mm., blackish. Pronotum: length .64 mm., width at base 1.05 mm.; disk dark chestnut brown, shining, calli, collar, and anterior half of propleura, reddish brown. Scutellum conically produced, distinctly higher than in *triangularis;* mesoscutum declivent, sloping sharply downward to the grooved line separating the scutellum. Hemelytra dusky brown, fuscous bordering the white

spots and inner apical angles of corium; white spots nearly as in *triangularis,* a subtriangular white spot on basal half of corium, its apex on clavus and base on embolium; a smaller white spot on corium bordering base of cuneus, also a small round spot on corium bordering claval suture just before apex of clavus. Cuneus dark chestnut brown to blackish, shining; embolium brownish black between the white spots, also shining. Membrane and veins uniformly dark fuscous. Ventral surface and legs dark brown to blackish, hind coxae, ostiolar peritreme, and middle coxae except base, white. Dorsum sparsely clothed with erect, long pale hairs, also intermixed with some shorter pubescent hairs.

Holotype: ♂, Fort Davis Mountains, TEXAS (O. C. Poling); author's collection.

Cyrtopeltocoris gracilentis n. sp.

Allied to *albo-fasciatus* Reut., but differs in the longer second antennal segment, more slender head and more strongly arched scutellum.

♂. Length 3.5 mm.; width across base of cuneus 1.04 mm. Head: width .69 mm., vertex .30 mm.; from base of vertex to tip of tylus .60 mm., height of an eye .35 mm. Antennae: segment I, length .23 mm.; II, 1.04 mm.; III, .86 mm.; IV, .60 mm.; pale dusky, last two segments more brown. Pronotum: length 1.04 mm., width at base .86 mm. Scutellum more strongly convex or conically produced than in *albo-fasciatus.* Color reddish brown to dark brown and with white marks nearly as in *albo-fasciatus.* With band of white crossing clavus midway between tip of scutellum and tip of clavus and extending across corium to radial vein; also white on tip of corium bordering cuneus. Membrane and veins uniformly pale fuscous. Legs brown, hind and middle coxae and the trochanters, pale; apices of tibiae pale; tarsi, fuscous apically. Clothed with fine, short, pale pubescence, sparsely intermixed on hemelytra and scutellum with a few long, erect pale hairs.

Holotype: ♂ September 5, 1926, Eufaula, ALABAMA (H. H. Knight), collected at light; author's collection.

I have previously recorded this specimen as *Cyrtopeltocoris albo-fasciatus* Reut. (Can. Ent., lix, 1927, p. 41), but more critical study shows that it is structurally distinct, although having a very similar color aspect.

The Sexes of Andrena hitei Cockerell (Hym.: Andrenidae).

By ELVEN C. NELSON.

In 1907 Professor T. D. A. Cockerell described in the Annals and Magazine of Natural History *Andrena hitei* from Boulder, Colorado. The species was described from the female, a strikingly attractive species of *Andrena*. Ever since an unsuccessful search has been made for the male. There is no male in this region which looks like the female, but this is not astonishing for often the male is very unlike the female. Curiously enough there is a beautiful *Andrena* in the European fauna which looks so much like our species that the two can be confused. The most conspicuous difference is the size, the European species, *A. fulva* Schrank, being larger than *hitei*. The male of the European species is known. Professor Cockerell received some of these males and at once was struck by the thought that the male of *hitei* might be similar to that of *fulva*. I was asked to see if I could find a male which answered the requirements. Several species were near but no good evidence was present to prove that any one was the correct male.

I have been working on the genitalia of *Andrena* and in view of the results from this work I felt that the correct male could be found by means of the genitalia.

Fig. 1. *Andrena hitei*, Cockerell (*rubifloris* Viereck and Cockerell). Specimen from Florissant, Colorado.
Fig. 2. *Andrena fulva*, Schrank. Specimen from Europe.
A. Genital armature. B. Eighth ventral plate. C. Seventh ventral plate.

I made dissections of *fulva* and the possible males of *hitei*, and the results were even better than had been expected. I found that only one male had genitalia which closely resembled

those of *fulva*. This male also most nearly meets the other requirements as shown by *fulva*.

This male was described as *A. ribifloris* in 1914 by Viereck and Cockerell in a paper "New North American Bees of the Genus Andrena" in the Proceedings of the United States National Museum, vol. 48, p. 32 (1914). The species was described from Florissant, Colorado, and has since been collected near Gresham in Boulder County. The female of the species was not found at Florissant but it is not uncommon to find the males of *Andrena* without accompanying females. I have collected *A. hitei* at Boulder, visiting flowers of *Ribes*, the genus of plants from which the male *ribifloris* was collected. According to Viereck (in letter to Cockerell) *A. hitei* occurs also in Nebraska and Montana. Without any reasonable doubt *ribifloris* is the male of *hitei*. The name *hitei* has priority over the name *ribifloris*.

Some Mating Habits of Callosamia promethea and Telea polyphemus (Lepid.: Saturniidae).

On June eighteenth a female *Callosamia promethea* moth emerged from a cocoon on our screened porch and by three o'clock in the afternoon a flock of males had collected. One of these was introduced into the cage with the female and mated immediately. For experiment's sake, another male was introduced into the cage. He shortly found his way to the mated pair and tried persistently to force them apart with his feet, abdomen and claspers. Being unsuccessful, he obtained a grip on the female's abdomen close to the first male and clung there until we pulled him off.

That same evening two female moths of *Telea polyphemus* were tied out for mating. On the morning of June the nineteenth, we examined them at 4.30 o'clock and found one with two males clinging to her in exactly the same manner as the *Promethea* male of the previous afternoon, while the other female moth was alone. We took the moths in and removed the superfluous male from the mating pair and placed him with the lone female. He mated with her but they did not stay together long.

This may be a common occurence, but in our many years of observation we have never seen it happen before or read of its happening.

HARRIET A. WICKWIRE.
ADELE CALALE.

On the Naming of Individual Variants in Lepidoptera.

By ALEXANDER B. KLOTS, Cornell University, Ithaca, N. Y.

(Continued from page 302).

SHALL WE APPLY SCIENTIFIC NAMES TO INDIVIDUAL VARIANTS?

The purpose of taxonomy is twofold. In the first place the taxonomist must differentiate organisms and attach to each one a scientific name so that ready reference may be had to it by means of this name. This is nomenclature, and one of its most fundamental principles is that the name of an organism should furnish a *permanent, easy* and *convenient* index to the organism. Secondly the taxonomist, by a study of all possible characters, attempts to so classify organisms that his sytem of classification will show the past and present relationships of the organisms to each other. This is phylogeny.

Phylogeny is of undeniable importance, but must not be allowed to overburden nomenclature. From the binomial system of Linnaeus we have progressed to a recognized trinomial system. The use of subgenera is still optional, but such use means many quadrinomials. Numerous workers may take exception to this (9) but on the whole the use of the quadrinomial is well established. Surely this is far enough.

Let us then see what would be the result if, following the system of naming advocated by Gunder we should attempt to classify a hypothetical species which possessed all of the forms that this system holds nameable. Such species may conceivably exist, although the writer is glad to say that he has not seen any printed reference to such a conglomeration . The result would be: *Claudius (Megaclaudius) crosbyi occidentalis* f. loc. *pasadenensis* f. aest. *megacephalus* f. ♀ *inimicus* f. tr. *absurdus* Jones. That is an example of phylogeny overbalancing nomenclature. Very few taxonomists could stand the continued strain of association with such horrors.

In view of the possibility of such absurdities becoming an

everyday occurrence it seems that serious consideration should be given to the emendation of Article 14 of the International Code of Zoological Nomenclature suggested by the British National Committee on Entomological Nomenclature (10). According to this emendation any term used as a "name" for any concept lower than subspecies would have no status in respect of priority. The effect of this in lightening the burden of nomenclature would undoubtedly be excellent. However even with the rigid definition of "subspecies" as "being a geographical or (in the case of parasites) host variation" specimens might be named as "subspecies" by over-enthusiastic workers, or by individuals over-anxious to see their names in print, which did not entirely merit that definition.

In fairness to Mr. Gunder the author must state that in the previously cited "octonomial" the only category originated in Mr. Gunder's system is that of "local form". Even that is not strictly original with him, being identical with various categories of Continental authors.

In Barnes and Benjamin's Check List of North American Diurnals (11) now four years old, 18 names are listed under *Eurymus philodice* (Godt.) as either valid names or synonyms applicable to categories lower than subspecies. Still more such names have since been applied, I believe. It so happens that we know something about the genetics of *philodice* (3) but even with the knowledge that the white female form of this species is Mendelian, or perhaps because of this knowledge, it is the opinion of many (13, 14) perhaps of most entomologists that these forms should not be given scientific names . In dropping them the burden of the overworked taxonomist and cataloguer would be immeasurably lightened. In the genus *Euphydryas* the case is even worse. In his recent revision of the genus, which, incidentally, includes some really valuable taxonomic work, Gunder lists 23 such names under *E. chalcedona* (Dbldy. & Hew.) (12).

In the same check list we find that under *Basilarchia weidemeyrii* (Edw.) the name *sinefascia* (Edw.) is used to designate

the race from Arizona, while *angustifascia* B. & McD. is listed as "f. norm.". The absurdity for the necessity for such procedure becomes apparent when we consider that *sincfascia* applies to a rare individual variant, while the great majority of specimens of the race are *angustifascia*. That a name applied to a rare aberration should have to be used to include all of the normal specimens as well and that a separate name should then have to be applied to these is against all taxonomic principles.

Needham (9) has recently entered a plea for the use of common sense in limiting the length of names, in which all thinking zoologists and botanists cannot but join. The International Commission on Zoological Nomenclature has taken a most praiseworthy stand in the matter by holding as invalid such names as *Brachyuropushkydermatogammarus*. What then are we to think of such names as *hemilutcofuscus* and *nigrisupernipennis* as applied by Gunder to "transition forms" of *Euphydryas chalcedona* and *colon* respectively (11)? It is as if "octonomials" were not enough and we must needs break the taxonomist's back with such jaw-twisters.

Inasmuch as at least a considerable number of individual variants are probably mutations, the naming of such individuals would actually be objectionable to geneticists. To the geneticist belongs the right to designate these individuals after his own fashion. He has his own system of so doing, one much better adapted to his peculiar needs than that of formal scientific nomenclature, and he should be permitted to apply it as he wishes.

All this does not mean that the writer considers that the taxonomist should have nothing to do with individual variants. If he is a good taxonomist he will indeed be vitally interested in them, for he sees that in many of them there is the stuff of which evolution is made. But if he is a wise taxonomist he will leave their detailed study to the geneticist who specializes in that study, and will be content to accept the geneticist's conclusions about them. He can help the geneticist by collecting

variants and by figuring them and publishing data on them, thus giving the geneticist an idea of what experimental material may be available. Such work can also be of value to the collector who may be at a loss as to what name to apply to an aberrant specimen, and who might otherwise unwisely name it as a species or subspecies. As such it should be encouraged and given every help; but it should not be considered as a part of scientific nomenclature.

Summary and Conclusions.

1. Individual variants whose aberrant characters are non-inheritable can have no effect on the evolution of their species. Individual variants whose aberrant characters are inheritable may have a very decided effect upon the evolution of their species. In any case the detailed study of such variants should be undertaken only by a properly qualified geneticist and is not a part of the work of the taxonomist, although the results of such study are of profound interest to him.

2. Any attempt to classify individual variants by phenotypic characters alone is necessarily superficial and may be extremely misleading. While such classifications may be of interest they can be of value only if all phenotypic characters are taken into account.

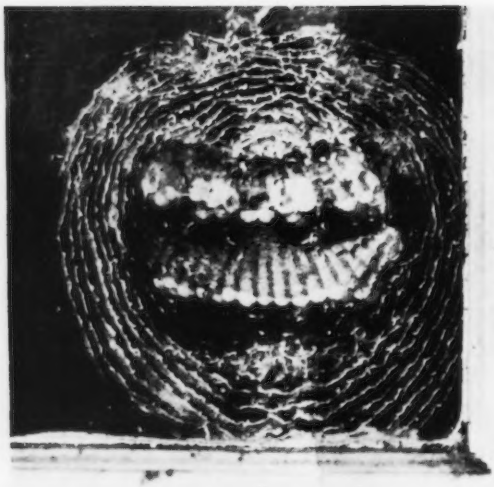
3. The term "transition form" as defined by Gunder is superfluous, meaning no more than "Mendelian form" or "mutant". "Transition form" as used by Gunder has come to mean no more than "series of aberrations" and is therefore superfluous in this sense as well.

4. Scientific names should not be applied to any concept lower than subspecies, and when so applied should have no status in scientific nomenclature. If designation of such forms is necessary this should be done in some manner which cannot be confused with scientific nomenclature.

5. Open discussion in print by taxonomists and geneticists of the subject of classification and designation of concepts less than subspecies is very much to be desired.

Bibliographic References.

1. Gunder, J. D. 1927. Transition forms (Lepid.: Rhopalocera). Ent. News. 38:263-271. Pl. 5-10.
2. Cockerell, T. D. A. 1930. Variation in Lepidoptera. Bull. Brooklyn Ent. Soc. 25:9-10.
3. Gerould, J. H. 1923. Inheritance of white wing color, a sex-limited (sex-controlled) variation in yellow Pierid butterflies. Genetics. 8:495-551.
4. Gunder, J. D. 1929. New Butterflies and sundry notes. Bull. Brooklyn Ent. Soc. 24:325-332. 2 pl.
5. Fischer, E. 1901, 1903. Lepidopterologische Experimental-forschungen. Allg. Zeitschr. f. Entom. 6:49-51, 305-307, 325-327, 377-381 and 8:221-228, 269-284, 316-326, 356-368.
6. Standfuss, M. 1899. Gesamtbild der bisher vorgenommenen Temperatur- und Hybridationsexperimente. Insektenbörse. Vol. 16.
7. Harrison, G. W. H. and Garrett, F. C. 1926. The induction of melanism in the Lepidoptera and its subsequent inheritance. Proc. R. Soc. London. (B) 99:241-263.
8. Meijere, J. C. H. de. 1910. Über Jacobsons Zuchtungversuche bezüglich des Polymorphismus von Papilio memnon L. ♀, und über die Vererbung secundärer Geschlechtsmerkmale. Zeitschr. f. indukt. Abstamm. u. Vererb. 3:161-181.
9. Needham, J. G. 1930. Scientific names. Science. 71 (n. ser.) : 26-28.
10. Report of the British National Committee on Entomological Nomenclature. Proc. Ent. Soc. London. 1928. 1R-13R.
11. Barnes, W. and Benjamin, F. H. 1926. List of the diurnal Lepidoptera of boreal America north of Mexico. Bull. South. Calif. Acad. Sci. 25:3-27.
12. Gunder, J. D. 1929. The genus Euphydryas Scud. of boreal America (Lepidoptera, Nymphalidae). Pan-Pac. Entomologist. 6:1-8.
13. Lindsey, A. W. 1924. Some problems of taxonomy. Denison Univ. Bull. Journ. Scientific Laboratories. 20: 289-305.
14. Ferris, G. F. 1928. The principles of systematic entomology. Stanford Univ. Publications, Univ. Series, Biological Sciences, Vol. 5, No. 3.



NEST OF VESPULA ARENARIA.—HUNGERFORD.

An Unusual Nest of Vespula (Dolichovespula) arenaria Fabr. (=V. diabolica de Saussure[1]). (Hym.: Vespidae).

(Plate XXXIV.)

By H. B. HUNGERFORD, Lawrence, Kansas.[2]

Our paper-making wasps are among the most generally known insects. Even the casual observer recognizes these wasps and their paper nests and has proper respect for the ability of the insects to resist undue familiarity. The more observing student finds the habits of these wasps of absorbing interest. He knows from experience that much of the sinister reputation of these little creatures can be discounted. With due regard for their nervousness and respect for their proper rights one may learn a great deal about the home life of these paper makers. The material of which their nests are made is composed of fibers of weathered or decayed wood properly masticated. We have two common sorts of "paper makers", the Polistes that suspend a single open comb from some support[3] and the Vespas which have two or more combs, one beneath the other enclosed in a paper bag. The Polistes in their open combs can be studied with ease. The Vespas, on the other hand, which live either in a covered house suspended from a tree limb or other support or in the ground are not observable. The accompanying photographs show how one colony of *Vespula arenaria* Fabr. (= *V. diabolica* de Saussure) built an "observation hive" of its own free will and accord. This was in an old abandoned log cabin at the south end of Munro Lake, Cheboygan County, Michigan. The nest was built between a window and the rough boards used in "boxing up" the window on the outside. The interspace between glass and board was approximately one inch. The wasps had gained entrance through a crack between the boards and fashioned an interesting sectional nest. This nest was one inch thick—four and a quarter inches wide, by four and a half inches high. It consisted of two layers of comb and was covered with nine layers

[1] Determination made by Doctor J. Chester Bradley.

[2] Contribution from the Biological Station of the University of Michigan, Douglas Lake, Michigan.

[3] See Phil Rau, Ecology, Volume X, No. 2, April, 1929.

of paper, the edges of which adhered closely to the glass on one side and to the board on the other. These several paper walls with their interspaces, make a splendidly insulated shelter. The wasps were studied, of course, from the inside of the house where their activity in the nest could be observed through the glass window pane. There was a remarkable difference in the temperature between the surface of the glass in front of the nest and elsewhere on the window—that in front of the nest was decidedly warm, elsewhere it was cool to cold, depending upon the weather. These Vespas heated their brood chamber and maintained the temperature against the lowered degrees outside.

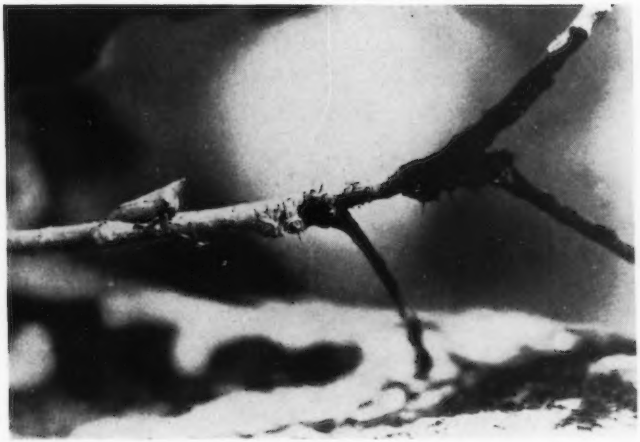
On August 9th, 1929, Doctor George Nichols made some flash light photographs of the nest as seen from within the building and Mr. F. Gray Butcher and I placed a charge of carbon bisulphide in the space and then carefully loosed the nest from the window pane and now have it mounted with its board support in a small case for exhibition at the Biological Station of the University of Michigan on Douglas Lake. We caught one queen and twenty-five workers. There were others flying about.

Maternal Instinct in a Membracid (Platycotis vittata) (Homop.).

By R. H. Beamer, Dept. of Entomology, University of Kansas, Lawrence, Kansas.

(Plate XXXV.)

Numerous nymphs of *Platycotis vittata* were taken in the Sequoia National Forest, Tulare Co., California, on a broad leafed oak. Persistent use of nets, however, failed to procure a single adult and the party began scanning the tips of oak twigs for nests of nymphs in the hopes of finding out more about this interesting membracid. Soon a cluster of very small nymphs was located and, sitting an inch or so down the twig from the nearest little one, was an adult female. Continued examination of the nearby oaks revealed several nests and in almost every case, a female stood sentinel, always between the



MATERNAL INSTINCT IN A MEMBRACID—BEAMER.

young and the body of the tree. She would move around the limb when approached but would allow herself to be taken rather than fly away from her perch. The occurrence was too regular to be a mere coincidence and it was conjectured that the mother must actually guard her young throughout their nymphal stages. As if to add the needed proof for the obvious conclusion, a small wasp (Vespidae), flew toward a nest of 5th instar nymphs. When it approached to within an inch or so of the twig, the membracid flew at it. The wasp deflected its course circled and returned. The membracid, which had alighted on the twig on the other side of her nest, dashed at the wasp again. Again the wasp missed the twig but returned in a few seconds. Each time as the wasp approached, the mother raised her wings to be ready and when the wasp drew near, she dashed at it with such fury as to frighten it away. Once the vespid alighted on the nymphs but was instantly attacked and left without its prey. After perhaps a dozen attempts the vespid apparently grew discouraged and departed. The membracid flew to her young, crawled over the spot where the vespid had alighted, apparently examined to see that they were uninjured; then, making sure all was well again flew to the twig just below the nest, turned her head toward her young and stood immobile.

The twigs where the young are found are marked with small punctures arranged in spiral form part way around the limb. The rows of spirals are perhaps ½ inch apart. The nymphs sit very close together on the limb often overlapping each other and cling tenaciously to their support.

The accompanying photograph (Plate XXXV) shows the mother guarding her young.

Proterandry and Flight of Bees. III. (Hym.: Apoidea.)

By CHARLES ROBERTSON, Carlinville, Illinois.

The first paper was in ENT. NEWS 29:341, the second in 41: 154. Except in Bombidae and Halictidae, cases in which the male is first and the female last may be regarded as normal and the rest fragmentary. Some bees, however, are known to be proterogynous.

♂ first, ♀ last, fragmentary.

ANDRENA SALICACEA ♂ March 25-April 2, ♀ April 16-26.
EPIMELISSODES ILLINOENSIS ♂ July 13, ♀ July 16-Aug. 13.
PROSOPIS THASPII ♂ May 8, ♀ June 9-15.

♂ first, ♂ ♀ end together.

CLISODON TERMINALIS ♂ May 25-July 27, ♀ June 6-July 27.
NOMADA CRESSONII ♂ April 20-May 18, ♀ May 3-18.
PROSOPIS EULOPHI ♂ May 12-June 15, ♀ June 13-15.
TRIEPEOLUS HELIANTHI ♂ Aug. 11-Oct. 3, ♀ Sept. 18-Oct. 3.

♂ first and last.

COLLETES NUDUS ♂ June 20-Aug. 2, ♀ July 10-27.
HOLCOPASITES ILLINOENSIS ♂ June 6-Aug. 23, ♀ June 9-Aug. 9.
NOMADA PARVA ♂ May 5-29, ♀ May 11-14.
SIMPLEX ♂ March 26-April 11, ♀ April 10.
VICINA ♂ Sept. 8-Oct. 19, ♀ Sept. 15-Oct. 15.
XANTHIDIUM LUTEOLOIDES ♂ April 4-May 5, ♀ April 21-May 3.
PERDITA OCTOMACULATA ♂ Aug. 13-Sept. 24, ♀ Aug. 17-Sept. 20.
PERDITELLA BOLTONIAE ♂ Aug. 30-Sept. 8, ♀ Sept. 3.
PROSOPIS SANICULAE ♂ May 15-Sept. 13, ♀ May 31-July 8.
TRIEPEOLUS NEVADENSIS ♂ July 7-Sept. 6, ♀ July 26-Aug. 27.
REMIGATUS ♂ June 28-Sept. 3, ♀ July 9-Aug. 29.

♂ ♀ first, ♀ last.

ANDRENA CARLINI March 20, ♂ ends April 28, ♀ June 9.
INTEGRA May 23, ♂ ends June 8, ♀ June 23.
NUBECULA Aug. 13, ♂ ends Sept. 25, ♀ Oct. 30.
SALICIS March 17, ♂ ends April 22, ♀ May 2.
SALICTARIA March 31, ♂ ends April 29, ♀ June 22.
OPANDRENA ZIZIAE May 3, ♂ ends May 26, ♀ June 17.
PARANDRENA ANDRENOIDES March 20, ♂ ends May 17, ♀ June 5.
PTERANDRENA SOLIDAGINIS Aug. 13, ♂ ends Oct. 19, ♀ Oct. 22.
PTILANDRENA POLEMONII April 14, ♂ ends May 11, ♀ May 20.
TRACHANDRENA CLAYTONIAE April 10, ♂ ends May 12, ♀ June 19.
COLLETES AESTIVALIS May 8, ♂ ends June 23, ♀ July 1.
ASHMEADIELLA BUCCONIS June 6, ♂ ends June 13, ♀ Aug. 29.
COELIOXYS SAYI May 21, ♂ ends Sept. 12, ♀ Oct. 4.
MEGACHILE MENDICA May 16, ♂ ends Sept. 30, ♀ Oct .11.

PROCHELOSTOMA PHILADELPHI May 8, ♂ ends June 23, ♀ June 26.
SAYAPIS POLLICARIS June 25, ♂ ends July 6, ♀ July 10.
ANTHEMURGUS PASSIFLORAE July 21, ♂ ends Aug. 30, ♀ Sept. 9.
CALLIOPSIS ANDRENIFORMIS May 30, ♂ ends Sept. 19, ♀ Oct. 14.
HETEROSARUS PARVUS May 28, ♂ ends June 15, ♀ Oct. 23.
PSEUDOPANURGUS ASTERIS Aug. 23, ♂ ends Oct. 21, ♀ Oct. 23.

♂ ♀ first, ♂ last.

ANDRENA ILLINOENSIS March 25, ♂ ends May 24, ♀ May 22.
OPANDRENA PERSONATA April 24, ♂ ends June 11, ♀ June 8.

♀ first and last.

ANDRENA MANDIBULARIS ♂ March 29-April 25, ♀ March 17-May 22.
NASONII ♂ May 3-18, ♀ April 21-May 31.
IOMELISSA VIOLAE ♂ April 11-29, ♀ March 30-May 20.
OPANDRENA BIPUNCTATA ♂ March 25-May 22, ♀ March 17-June 1.
SEROTINA ♂ May 12-June 25, ♀ May 4-July 7.
PTERANDRENA aliciae ♂ Aug. 24-26, ♀ Aug. 13-Sept. 20.
PTILANDRENA erigeniae ♂ April 5-May 3, ♀ March 25-May 14.
TRACHANDRENA hippotes ♂ April 12-May 18, ♀ April 10-June 29.
MARIAE ♂ March 26-May 5, ♀ March 25-May 17.
NUDA ♂ May 1-June 13, ♀ March 17-June 16.
SPIRAEANA ♂ June 1, ♀ May 30-June 11.
AMEGILLA WALSHII ♂ July 14-31, ♀ July 6-Sept. 20.
CERATINA DUPLA ♂ March 21-Oct. 23, ♀ March 17-Nov. 6.
EPEOLUS PUSILLUS ♂ Aug. 26-Sept. 25, ♀ Aug. 14-Oct. 23.
EPIMELISSODES ATRIPES ♂ Aug. 21, ♀ Aug. 4-Sept. 8.
MELISSODES TRINODIS ♂ July 3-Sept. 25, ♀ June 14-Oct. 6.
COELIOXYS RUFITARSIS ♂ July 11-17, ♀ July 4-Oct. 19.
DICERATOSMIA CONJUNCTA ♂ April 28, ♀ April 14-July 4.
HOPLITIS CYLINDRICUS ♂ April 27-May 15, ♀ April 21-July 20.
NEOTRYPETES BARBATUS ♂ June 20, ♀ June 15-July 17.
XANTHOSARUS LATIMANUS ♂ June 7-Oct. 6, ♀ May 28-Oct. 20.
HOLONOMADA AFFABILIS ♂ April 23-June 21, ♀ April 18-June 28.
PLACIDA ♂ Sept. 8-27, ♀ Sept. 6-Oct. 19.

PSEUDOPANURGUS RUDBECKIAE ♂ Aug. 3-Sept. 7, ♀ Aug. 1-Sept. 12.
SOLIDAGINIS ♂ Aug. 12-Sept. 7, ♀ Aug. 11-Oct. 4.
VERBENAPIS VERBENAE ♂ July 2-Sept. 1, ♀ June 28-Sept. 10.
ZAPERDITA MAURA ♂ July 17-Aug. 1, ♀ July 7-Sept. 3.
PROSOPIS ILLINOENSIS ♂ May 12-Aug. 30, ♀ May 9-Sept. 20.

♀ first, ♂ last.

CALLIOPSIS COLORADENSIS ♂ Aug. 21-Sept. 24, ♀ Aug. 20-Sept. 19.
MEGACHILE PETULANS ♂ June 19-Sept. 20, ♀ June 17-Sept. 2.
PSEUDOPANURGUS ALBITARSIS ♂ June 11-Sept. 8, ♀ May 29-Sept. 5.

Halictidae.

AGAPOSTEMON RADIATUS ♀ April 1-Nov., ♂ June 21-Nov.
SPLENDENS ♀ May 1-Oct. 28, ♂ July 13-Oct. 28.
TEXANUS ♀ April 10-Oct. 21, ♂ July 11-Nov.
VIRESCENS ♀ May 8-Nov., ♂ July 21-Nov.
AUGOCHLORA FERVIDA ♀ May 10-Nov., ♂ July 5-Oct. 28.
VIRIDULA ♀ March 25-Oct. 30, ♂ July 2-Oct. 20.
CHLORALICTUS ALBIPENNIS ♀ May 8-Oct. 3, ♂ July 17.
COERULEUS ♀ April 10-May 15, ♂ June 15.
COREOPSIS ♀ April 14-Nov., ♂ June 18-Nov.
CRESSONII ♀ March 17-Sept. 26, ♂ July 2-Oct. 31.
ILLINOENSIS ♀ April 1-Nov., ♂ July 9-Nov.
NYMPHAEARUM ♀ May 5-Aug. 12, ♂ July 27.
OBSCURUS ♀ April 23-Oct. 15, ♂ June 6-Nov.
PILOSUS ♀ March 17-Nov., ♂ June 6-Nov.
PRUINOSUS ♀ March 21-Aug. 25, ♂ June 7-Oct. 24.
SPARSUS ♀ March 21-Nov., ♂ June 4-Nov.
TEGULARIS ♀ March 26-Nov., ♂ June 10-Oct. 25.
VERSATUS ♀ March 17-Nov., ♂ June 6-Nov.
ZEPHYRUS ♀ March 21-Nov., ♂ June 7-Nov.
CURTISAPIS CORIACEA ♀ April 5-Sept. 30, ♂ July 23-Oct. 19.
FORBESII ♀ March 28-Oct. 31, ♂ June 15-Oct. 28.
FUSCIPENNIS ♀ June 14-27, ♂ Oct. 1-Nov.
DIALICTUS ANOMALUS ♀ May 9-Oct. 31, ♂ Oct. 11-31.
EVYLAEUS ARCUATUS ♀ March 25-Nov., ♂ June 14-Aug. 8.
FOXII ♀ March 25-Sept. 20, ♂ June 8-July 8.
NELUMBONIS ♀ May 22-Aug. 20.
PECTINATUS ♀ June 11-Aug. 25.
PECTORALIS ♀ April 16-Nov., ♂ June 16-Nov.
QUADRIMACULATUS ♀ April 22-Oct. 18, ♂ July 10-13.
TRUNCATUS ♀ April 26-Aug. 13, ♂ June 29.

HALICTUS LEROUXII ♀ March 17-Oct. 19, ♂ June 10-Aug. 26.
PARALLELUS ♀ May 10-Aug. 29, ♂ June 24-Oct. 10.
ODONTALICTUS LIGATUS ♀ March 31-Nov., ♂ June 6-Nov.
OXYSTOGLOSSA CONFUSA ♀ March 25-Nov., ♂ June 18-Oct. 30.
PURA ♀ March 21-Nov., ♂ June 8-Nov.
SIMILIS ♀ April 18-Nov., ♂ June 16-Oct. 28.
PARALICTUS CEPHALICUS ♀ May 9-July 21, ♂ July 15.
PLATYPARIUS ♀ March 17-Nov., ♂ Sept. 20-23.
SIMPLEX ♀ April 17-June 26.
SELADONIA FASCIATA ♀ March 17-Oct. 31, ♂ June 9-Oct. 31.

Of the females, 17 begin in March, 12 in April, 9 in May, 2 in June; 17 end in November, 11 in October, 3 in September, 6 in August, 1 in July, 2 in June, 1 in May. Of the males, 20 begin in June, 8 in July; 13 end in November, 12 in October, 2 in August, 1 in July.

Sphecodini

DIALONIA ANTENNARIAE ♀ April 18-Oct. 2, ♂ Sept. 4.
DREPANIUM FALCIFERUM ♀ April 11-July 26, ♂ July 7.
MACHAERIS STYGIA ♀ April 24-Oct. 15.
PROTERANER RANUNCULI ♀ April 25-Sept. 19, ♂ April 26-Oct. 28.
SPHECODES ARVENSIS ♀ March 31-Aug. 17, ♂ June 14-Aug. 20.
HERACLEI ♀ May 17-Aug. 24, ♂ July 13-Aug. 2.
MINOR ♀ April 20-July 29.
SPHECODIUM CRESSONII ♀ April 19-Oct. 23, ♂ June 11-Oct. 29.
SMILACINAE ♂ June 19-Aug. 11.

Of the females, 1 begins in March, 6 in April, 1 in May; 2 end in July, 2 in August, 1 in September, 3 in October. Of the males, 1 begins in April, 3 in June, 1 in July; 3 end in August, 2 in October.

Bombidae

BOMBIAS AURICOMUS ♀ April 11-Oct. 23, ☿ July 1-Sept. 24, ♂ July 9-Oct. 5.
FRATERNUS ♀ April 18-Sept. 16, ☿ July 5-Oct. 9, ♂ July 30-Oct. 15.
SEPARATUS ♀ April 12-Oct. 25, ☿ May 16-Oct. 8, ♂ July 5-Oct. 10.
BOMBUS AMERICANORUM ♀ March 15-Nov., ☿ May 18-Oct. 24, ♂ July 10-Oct. 27.
BIMACULATUS ♀ April 4-May 23, ☿ May 14-July 28, ♂ July 7-21.

IMPATIENS ♀ April 7-Oct. 5, ♀ May 16-Nov., ♂ July 9-Nov.
VAGANS ♀ April 7-Sept. 3, ♀ May 15-Oct. 1, ♂ July 27-Oct. 3.
PSITHYRUS LABORIOSUS ♀ June 22-Aug. 12, ♂ Aug. 11-Sept. 18.
VARIABILIS ♀ April 28-Oct. 19, ♂ Aug. 4-Nov.

Of females of Bombinae, 1 begins in March, 6 in April; 1 ends in May, 2 in September, 3 in October, 1 in November. Of the workers, 5 begin in May, 2 in July; 1 ends in July, 1 in September, 4 in October, 1 in November. Of the males, 7 begin in July; 1 ends in July, 5 in October, 1 in November.

Except *Proteraner*, the Halictidae and Bombidae are really proterandrous. The early females belong with the males of the fall before.

Entomological Literature

COMPILED BY LAURA S. MACKEY UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The numbers **within brackets** [ ] refer to the journals, as numbered in the list of Periodicals and Serials published in the January and June numbers (or which may be secured from the publisher of Entomological News for 10c), in which the paper appeared. The number of, or annual **volume**, and in some cases the part, heft, &c. the latter **within** ( ) follows; then the pagination follows the **colon** :

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

☞ *Note the change in the method of citing the bibliographical references, as explained above.*

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SPECIAL NOTICES.—Opuscula Ichneumonologica.—By O. Schmiedeknecht. Suppl. Bd. Fasc. 8. Completes the genus Amblyteles and begins Platylabus. p. 65-140; 1-4.

INSECTS THEIR WAYS AND MEANS OF LIVING, by ROBERT EVANS SNODGRASS, U. S. Bureau of Entomology. Volume Five of the Smithsonian Scientific Series (Editor-in-chief Charles Greeley Abbot, D.Sc., Secretary of the Smithsonian Institution. Published by Smithsonian Institution Series, Inc., New York) 1930. Pp. 10 (unnumbered), iv, 362. 15 pls. in colors, 186 text figures. [The books of this series are for sale only in the complete set.*]

We have a strong suspicion, derived from the preface of this entertaining volume, that the author, chiefly and favorably known as a morphologist and physiologist, has endeavored to make the subject of his studies not the "dry and tedious" matter which the reading public has considered it to be. As far as an entomological—and therefore biased—reader may judge, he has certainly succeeded. Who can resist this description of the termite queen and king? "With the increase in the activity of her ovaries, her abdomen enlarges and she takes on a matronly appearance, attaining a length fully twice that of her virgin figure and a girth in proportion. The king, however, remains faithful to his spouse; and he, too, may fatten up a little, sufficiently to give him some distinction among his multiplying subjects. The termite king is truly a king, in

* The publishers (50 Church St., New York), have supplied the following information. Smithsonian Scientific Series is sold in complete sets of twelve volumes, eight of which are ready for delivery. Subscriptions are taken for the complete set, bound in buckram $150, in parchment or red leather $198. A royalty of 10% of the sales price is paid to the Smithsonian Institution by the publishers and it is understood these funds are used for research purposes. Subjects of the other eleven volumes are briefly: 1. The Smithsonian Institution, 2. The Sun, 3. Minerals, 4. North American Indians, 6. Wild Animals, 7. Man, 8. Cold-Blooded Vertebrates, 9. Warm-Blooded Vertebrates, 10. Plant Life, 11. Invertebrates, 12. Mankind in China.

the modern way, for he has renounced all authority and responsibility and leads a care-free life, observing only the decorums of polite society and adhering to the traditions of a gentleman; but he also achieves the highest distinction of democracy, for he is literally the father of his country." (p. 139). "The golden rule of the termite colony is 'feed others as you would be fed by them'." (p. 144).

There are ten chapters: I. The Grasshopper [growth, development, enemies]; II. The Grasshopper's Cousins [the saltatory Orthoptera with an interesting presentation of their sound-production]; III. Roaches and Other Ancient Insects; IV. Ways and Means of Living [wherein structure and function are correlated]; V. Termites; VI. Plant Lice; VII. The Periodical Cicada [a hero who "has delivered the great thrill" so that "all his acts of everyday life acquire head-line values," but who evidently has not signed his "contracts with the box-office management in advance," his anatomy and his behavior at and immediately after hatching]; VIII. Insect Metamorphosis; IX. The Caterpillar and the Moth [with a detailed account of the anatomy and metamorphosis of the tent caterpillar—"a caterpillar is a young moth that has carried the idea of the independence of youth to an extreme degree, but which, instead of rising superior to its parents, has degenerated into the form of a worm"]; X. Mosquitoes and Flies.

We must give another sample of Mr. Snodgrass's advances to the reading public; it is from Chapter VI: "Moreover, the story is not yet complete, for it must be added that all the generations of the aphids, except one in each series, are composed entirely of females capable in themselves of reproduction. . . . How insects do upset our generalizations and our peace of mind! We have heard of feminist reformers who would abolish men. With patient scorn we have listened to their predictions of a millennium where males will be unknown and unneeded—and here the insects show us not only that the thing is possible but that it is practicable, at least for a certain length of time, and that the time can be indefinitely extended under favorable conditions." But ten pages later comes the denouement: "A prosperous, self-supporting feminist dominion appears to be established. When summer's warmth, however, gives way to the chills of autumn, when the food supply begins to fail, the birth rate slackens and falls off steadily, until extermination seems to threaten. By the end of September conditions have reached a desperate state. October arrives, and the surviving virgins give birth in forlorn hope to a brood

that must be destined for the end. But now, it appears, another of those miraculous events that occur so frequently in the lives of insects has happened here, for the members of this new brood are seen at once to be quite different creatures from their parents. When they grow up, it develops that they constitute a sexual generation, composed of females and *males!* Feminism is dethroned. The race is saved. The marriage instinct now is dominant, and if marital relations in this new generation are pretty loose, the time is October, and there is much to be accomplished before winter comes." (pp. 156, 166).

But the reviewer hastens to correct any impression that the book is frivolous or "flapperesque," which might arise from the reading of these quotations alone. The serious-minded reader will find no temptation to risibility in perusing the consideration of metamorphosis. "The real metamorphosis in the life of the butterfly . . . is not the change of the caterpillar into the adult, but the change of the butterfly egg in the embryo into a caterpillar. Yet the term is usually applied to the reverse process by which the caterpillar is turned back into the normal form of its species." (p. 228). Our author adopts the view of E. Poyarkoff that the pupa of insects with complete metamorphosis corresponds to the immature stage of the adult*—*not* the last nymphal stage—of insects with incomplete metamorphosis; that the reason for the pupa is probably to be found in the delayed growth of the adult muscles, the quicker hardening of the cuticular covering of the body wall and the consequent need of a new cuticula for the attachment of those muscles (pp. 254-261).

It is hardly necessary to tell those acquainted with Mr. Snodgrass's previous publications that the illustrations in the present volume, almost without exception, are from his own skillful pencil. May we also add that the unidentified damselfly, figure 2 of Plate I, is *Neurobasis chinensis* L., presumably race *australis* Selys.

MORPHOLOGY AND EVOLUTION OF THE INSECT HEAD AND ITS APPENDAGES. By R. E. SNODGRASS. Smithsonian Miscellaneous Collections, vol. 81, no. 3. Washington, Nov. 20, 1928, 155 pp., 57 figs.—This is the second of the morphological studies which the author initiated by his *Morphology and Mechanism of the Insect Thorax* (1927) noticed in the NEWS for October, 1927. It is strictly for the serious-minded, even though the first sentence expresses regret "that we must arrive at an under-

* A somewhat similar view was expressed by Deegener in his *Wesen und Bedeutung der Metamorphose bei den Insekten*, Leipzig, 1910, p. 69.

standing of things by way of the human mind." It consists of seven sections: I. Evolution of the arthropod head, II. General structure of the insect head, III. The head appendages, IV. Summary of important points, V. The head of a grasshopper, VI. Special modifications in the structure of the head [in various insects], VII. The head of a caterpillar. The most prominent feature is the constant recourse to the muscles to determine homologies and these organs are figured in detail. "The scientific study of the comparative anatomy of insects must look for its advance in the future to a wider knowledge of muscles and mechanism" (p. 90). "The importance of the study of musculature for the understanding of the insect skeleton . . . can not much longer be ignored" (p. 95). Out of the great mass of results presented we make arbitrary choice of a very few to be mentioned in this notice. The most generalized mandible in arthropods is best developed in Diplopods, where it is similar to a maxilla, lacking only a galea and a palpus (pp. 62-63). The mouth parts of arthropods have been derived from organs having the structure of *uniramous, ambulatory* legs; all the primitive arthropod appendages were probably of this character. Biramous and natatory appendages are characteristic of the Crustacea only and are probably secondary adaptations to an aquatic life (pp. 82-83). Crampton's view that the gula is a differentiation of the base of the labium is supported (pp. 128-131).

THE THORACIC MECHANISM OF A GRASSHOPPER, AND ITS ANTECEDENTS. By R. E. SNODGRASS. Smiths. Misc. Colls., vol. 82, no. 2. Washington, Dec. 31, 1929. 111 pp., 54 figs.—Here also chief use is made of the muscles in interpreting the skeleton. "Though the study of the insect skeleton will remain the most important branch of insect anatomy for purposes of taxononic description, it is becoming evident that the morphology of the skeleton is not to be understood without a knowledge of the relations that exist between the cuticular modifications and the muscles" (p. 51). The thoracic muscles of the Carolina locust (*Dissosteira carolina*) are here described and figured in detail. In his paper of 1927, Mr. Snodgrass recognized two lines of differentiation in the Pterygota through the adoption of different mechanisms for moving the wings; one of these was that found in the Odonata, the other in the rest of the winged orders. To-day his interpretation has changed: "The wing mechanism of the dragonflies is . . . merely an extreme modification of that common to all insects" (p. 94).

PHILIP P. CALVERT.

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

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